

DIGITAL MULTIMETER

OPERATOR'S MANUAL



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1. SAFETY INFORMATION

This multimeter has been designed according to IEC — 1010 concerning electronic measuring instruments with an overvoltage category (CAT II) and pollution 2.

Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition.

1.1 PRELIMINARY

- ※ When using this meter, the user must observe all normal safety rules concerning:
 - Protection against the dangers of electrical current.
 - Protection of the meter against misuse.
- ※ Full compliance with safety standards can be guaranteed only if used with test leads supplied. If necessary, they must be replaced with the same model or same electronic ratings. Measuring leads must be in good condition.

1.2 DURING USE

- ※ Never exceed the protection limit values indicated in specifications for each range of measurement.
- ※ When the meter is linked to measurement circuit, do not touch unused terminals.
- ※ When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
- ※ Before rotating the range selector to change functions, disconnect test leads from the circuit under test.
- ※ When carrying out measurements on TV or switching power circuits, always remember that there may be high amplitude voltages pulses at test points which can damage the meter.
- ※ Never perform resistance measurements on live circuits.
- ※ Always be careful when working with voltages above 60V dc or 30V ac rms. Keep fingers behind the probe barriers while measuring.

1.3 SYMBOLS



Important safety information, refer to the operating manual.



Dangerous voltage may be present.



Earth ground



Double insulation (Protection class II)

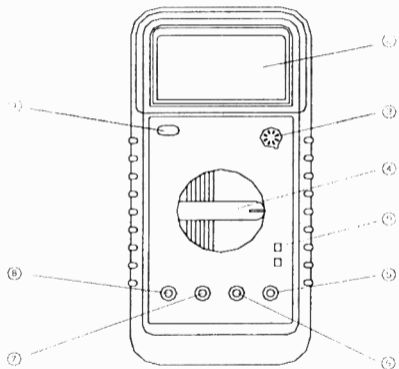
1.4 MAINTENANCE

- ※ Before opening the meter, always disconnect test leads from all sources of electric current.
- ※ For continue protection against fire, replace fuse only with the specified voltage and current ratings: F1: 2A/250V F2: 10A/250V
- ※ If any faults or abnormalities are observed, the meter can not be used any more and it has to be checked out.
- ※ Never use the meter unless the back cover is in place and fastened fully.
- ※ To clean the meter, use a damp cloth and mild detergent only, do not use abrasives or solvents on it.

2. DESCRIPTION

This meter is a portable professional measuring instrument with 3 1/2 digit LCD, capable of performing functions:

- DC voltage measurement, 5 ranges from 200mV to 1000V
- AC voltage measurement, 5 ranges from 200mV to 700V
- DC current measurement, 7 ranges from 20 μ A to 10A
- AC current measurement, 5 ranges from 2mA to 10A
- Resistance measurement, 7 ranges from 200 Ω to 200M Ω
- Diode test
- Transistor test
- Audible continuity test
- Temperature measurement



1. Power Switch
2. LCD Display
3. Transistor Testing Socket
4. Rotary Switch
5. V/ Ω Input Jack
6. COM Input Jack
7. A Input Jack
8. 10A Input Jack
9. Temperature Measuring Socket

2.1 FUNCTION AND RANGE SELECTOR

There are 9 functions and 32 ranges provided. A rotary switch is used to select functions as well as ranges.






2.2 POWER SWITCH

A push - push switch is used to turn the meter on or off.

To extend the battery life, Auto Power - Off function is provided (Optional). The meter will be turned off automatically within around 40 minutes. To turn on the meter again, Push the power switch to release it and then push it once more.

2.3 INPUT JACKS

This meter has four input jacks that are protected against overload to the limits. During use, connect the black test lead to the COM jack and red test lead as shown below :

FUNCTION	RED LEAD CONNECTION	INPUT LIMITS
200mV  / 200mV ~	V / Ω	250Vdc or rms ac
V  / V ~	V / Ω	1000Vdc, 700V rms ac (sine)
Ω	V / Ω	250Vdc or rms ac
	V / Ω	250Vdc or rms ac
A  / A ~	A	2A dc or rms ac
10A  / 10A ~	10A	10A dc or rms ac

Current ranges are protected by fuses.


3. OPERATING INSTRUCTION

3.1 MEASURING VOLTAGE

1. Connect the black test lead to the COM jack and the red test lead to the V/ Ω jack.
2. Set the rotary switch at the desired V \blacksquare or V \sim range position and connect test leads across the source or load under measurement.
3. Read LCD display. The polarity of the red connection will be indicated when making a dc voltage measurement.
4. When only the figure “ 1 ” is displayed, it indicates overrange situation and the higher range has to be selected.

3.2 MEASURING CURRENT

1. Connect the black test lead to the COM jack and the red test lead to the A jack for a maximum of 2A . For a maximum of 10A, move the red lead to the 10A jack.

2. Set the rotary switch at desired A  or A ~ range position and connect test leads in series with the load under measurement.
3. Read LCD display. The polarity of the red lead connection will be indicated when making a DC measurement.
4. When only the figure “ 1 ” displayed, it indicates overrange situation and the higher range has to be selected.


3.3 MEASURING RESISTANCE

1. Connect the black test lead to the COM jack and the red test lead to the V/ Ω jack. (NOTE :The polarity of red lead connection is positive “ + ”)
2. Set the rotary switch at desired Ω range position and connect test leads across the resistance under measurement. Read LCD display.

NOTE:

1. For resistance above $1\text{M}\Omega$, the meter may take a few seconds to stabilize reading.
2. When the input is not connected, i.e. at open circuit, the figure “ 1 ” will be displayed for the overrange condition.
3. When checking in - circuit resistance, be sure the circuit under test has all power removed and all capacitors are full discharged.
4. At $200\text{M}\Omega$ range display is 10 counts when test leads are shorted. These counts have to be subtracted from measuring results. For example, when measuring $100\text{M}\Omega$ resistance, the reading will be 101.0 and the correct measuring result should be $101.0 - 1.0 = 100.0 \text{ M}\Omega$.

3.4 TESTING DIODE


1. Connect the black test lead to the COM jack and the red test lead to the V/Ω jack. (NOTE: The polarity of red lead connection is positive “ + ”)
2. Set the rotary switch at  position and connect the red lead to the anode, the black lead to the cathode of the diode under testing. The meter will show the approx. Forward voltage drop

of the diode. If the lead connection is reversed, only figure “ 1 ” will be displayed.

3.5 TESTING TRANSISTOR


1. Set the rotary switch at hFE position.
2. Identify whether the transistor is NPN or PNP type and locate Emitter, Base and Collector lead. Insert leads of the transistor to be tested into proper holes of the testing socket on the front panel.
3. LCD display will show the approximate hFE value at the test condition of base current $10\mu\text{A}$ and $V_{ce} 3.2\text{V}$.

3.6 CONTINUITY TEST

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω jack.
2. Set the rotary switch at  position and connect test leads across two points of the circuit under testing. If continuity exists (i.e., resistance less than about 70Ω), built — in buzzer will sound.

3.7 MEASURING TEMPERATURE

1. Set the rotary switch at TEMP position and the LCD display will show the current environment temperature.
2. Insert “ K ” type thermocouple into the temperature measuring socket on the front panel and contact the object to be measured with the thermocouple probe. Read LCD display.

 **WARNING:** To avoid electric shock, be sure the thermocouple has been removed before changing to another function measurement.

4. SPECIFICATIONS

Accuracy is specified for a period one year after calibration and at 18 °C to 28 °C (64 °F to 82 °F) with relative humidity to 80 %.

4.1 GENERAL

MAXIMUM VOLTAGE BETWEEN
TERMINALS AND EARTH GROUND

1000Vdc or 700 rms ac (sine)

FUSE PROTECTION

A: 2A/250V, 10A: 10A/250V

POWER SUPPLY

9V battery, NEDA 1604 or 6F22

DISPLAY

LCD, 1999 counts MAX, updates 2 — 3/sec

MEASURING METHOD

Dual - slope integration A/D converter


OVERRANGE INDICATION

“ 1 ” figure only on the display

POLARITY INDICATION

“ — ” displayed for negative polarity

LOW BATTERY INDICATION

“  ” displayed

OPERATING TEMPERATURE

0 °C to 40 °C (32 °F to 104 °F)

STORAGE TEMPERATURE

— 10 °C to 50 °C (14 °F to 122 °F)

DIMENSION
WEIGHT

91 × 189 × 31.5 mm
310g (including battery)

4.2 DC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	± 0.5 % of rdg ± 1 digit
2V	1mV	± 0.5 % of rdg ± 1 digit
20V	10mV	± 0.5 % of rdg ± 1 digit
200V	100mV	± 0.5 % of rdg ± 1 digit
1000V	1V	± 0.8 % of rdg ± 2 digits

Input Impedance: 10MΩ.

4.3 AC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	$\pm 1.2\%$ of rdg ± 3 digits
2V	1mV	$\pm 0.8\%$ of rdg ± 3 digits
20V	10mV	$\pm 0.8\%$ of rdg ± 3 digits
200V	100mV	$\pm 0.8\%$ of rdg ± 3 digits
700V	1V	$\pm 1.2\%$ of rdg ± 3 digits

Input Impedance: $10M\Omega$.

Frequency Range: 40Hz to 400Hz

Response: Average, calibrated in rms of sine wave

4.4 DC CURRENT

Range	Resolution	Accuracy	Burden Voltage
20 μ A	0.01 μ A	$\pm 2\%$ of rdg ± 5 digits	10mV / μ A
200 μ A	0.1 μ A	$\pm 0.8\%$ of rdg ± 1 digit	1.0mV / μ A
2mA	1 μ A	$\pm 0.8\%$ of rdg ± 1 digit	100mV / mA
20mA	10 μ A	$\pm 0.8\%$ of rdg ± 1 digit	11mV / mA
200mA	100 μ A	$\pm 1.5\%$ of rdg ± 1 digit	2.0mV / mA
2A	1mA	$\pm 1.5\%$ of rdg ± 1 digit	0.4V / A
10A	10mA	$\pm 2\%$ of rdg ± 5 digits	0.03V / A

Overload Protection: 2A fuse for 20 μ A to 2A ranges, 10A fuse for 10A range.

4.5 AC CURRENT

Range	Resolution	Accuracy	Burden Voltage
2mA	1 μ A	± 1.0 % of rdg ± 3 digits	100mV / mA
20mA	10 μ A	± 1.0 % of rdg ± 3 digits	11mV / mA
200mA	100 μ A	± 1.8 % of rdg ± 3 digits	2.0mV / mA
2A	1mA	± 1.8 % of rdg ± 3 digits	0.4V / A
10A	10mA	± 3.0 % of rdg ± 7 digits	0.03V / A

Overload Protection: 2A fuse for 2mA to 2A ranges, 10A fuse for 10A range.

Frequency Range: 40Hz to 400Hz

Response: Average, Calibrated in rms of sine wave


4.6 RESISTANCE

Range	Resolution	Accuracy
200 Ω	0.1 Ω	$\pm 0.8\%$ of rdg ± 3 digits
2K Ω	1 Ω	$\pm 0.8\%$ of rdg ± 1 digit
20K Ω	10 Ω	$\pm 0.8\%$ of rdg ± 1 digit
200K Ω	100 Ω	$\pm 0.8\%$ of rdg ± 1 digit
2M Ω	1K Ω	$\pm 0.8\%$ of rdg ± 1 digit
20M Ω	10K Ω	$\pm 1.0\%$ of rdg ± 2 digits
200M Ω	100K Ω	$\pm 5.0\%$ of (rdg - 10 digits) ± 10 digits


Maximum Open Circuit Voltage: 700mV (3V for 200M Ω range).

Note: On 200M Ω range, if short input, display will read 1M Ω , this 1M Ω should be subtracted from measurement results.

4.7 DIODE

Range	Description	Test Condition
	Shows the approximate forward voltage drop	Forward Current 1mA Vce 3.2V

4.8 CONTINUITY

Range	Description
	Built - in buzzer will sound, if the resistance under test is less than about 70Ω

4.9 TEMPERATURE

Range	Resolution	Accuracy		
		- 20 °C to 0 °C	0 °C to 400 °C	400 °C to 1000 °C
- 20 °C to 1000 °C	1 °C	± 5.0 % of rdg ± 4 digits	± 1.0 % of rdg ± 3 digits	± 2.0 % of rdg

5. ACCESSORIES

5.1 SUPPLIED WITH THE MULTIMETER

Test leads	Electric Rating 1500V, 10A	HYTL - 060
Battery	9V NEDA 1604 or 6F22	
“ K ” type thermocouple	HYTP060010	
Operating Manual		
Holster		

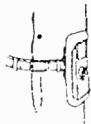
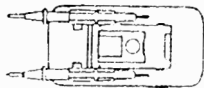
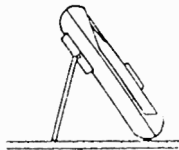
5.2 HOW TO USE THE HOLSTER

The holster is used to protect the meter and to make the measurement more comfortable. It comes with two stands installed together. The figures show how to use the holster to:

- a. Support the meter with a standard angle.
- b. Support the meter with a small angle using the little stand.
- c. Hang the meter on the wall using the little stand.

Take the little stand off from the back side of the large stand and insert it into holes located upper on the holster.

- d. Hold test leads.



6. BATTERY & FUSE REPLACEMENT

If the sign “  ” appears on the LCD display, it indicates that battery should be replaced.

Remove screws on the back cover and open the case. Replace the exhausted battery with a new one.

Fuse rarely need replacement and blow almost always as a result of the operator's error. Open the case as mentioned above, and then take the PCB out from the front cover. Replace the blown fuse with same ratings.

 WARNING

Before attempting to open the case, be sure that test leads have been disconnected from measurement circuits to avoid electric shock hazard.

For protection against fire, replace fuse only with specified ratings:

F1: 2A/250V

F2: 10A/250V

HYS004240